



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(54) Title:</b> FRESH CHEESE PRODUCT AND PROCESS FOR THE MANUFACTURE THEREOF		
<b>(57) Abstract</b>  The present invention pertains to cheese making technology and relates to a process for the preparation of a novel fresh cheese product, cheese-creme. Cheese-creme can be used in various ways either as such or as a raw material of food industry. In the preparation of cheese-creme milk is used and, if desired, also eggs or egg white, wherefrom by the means of acidity adjustment and heat treatment a cheese mass is obtained which, according to the process of the invention, is further worked up by homogenization.		

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Fresh cheese product and process for the manufacture thereof

The present invention pertains to cheese making technology and relates to a novel fresh cheese product which can be used in various ways either as such or as a raw material of food industry. The invention relates also to a process for the preparation of such a fresh cheese product.

An ordinary fresh curd cheese is made by using milk and eggs as basic raw materials, from the mixture of which the curd is coagulated using sour milk as souring agent. The coagulated curd is gathered up, salted, flavoured if appropriate, and packed into a mold.

Various processes for making fresh cheese type products have also been disclosed in the art. E.g. in US patents No. 2,558,256, 4,352,826 and 4,534,982 processes for making soft cheeses or curd are disclosed. However, all of these use acid or rennet or mixtures thereof as curdling agent, and the pH of the curd obtained is 4.6, which corresponds to the normal coagulating acidity of milk.

In WO 95/14389 a low-fat fresh cheese product and process for its manufacture is described. In the process rennet and acid are used to coagulate the curd, whereupon the pH of the curd is reduced to the value of 4.6 to 4.9.

We have now developed a novel fresh cheese product which differs from usual cheeses and which we call "cheese-creme". In the manufacture of cheese-creme either pure milk, which is preferably homogenized milk, or alternatively milk and eggs or egg white are used, from which with acidity adjustment and heat treatment curd is obtained which is further worked up by homogenization according to the process of the invention. In an especially preferred embodiment the cheese-creme of the invention is

prepared using pure milk without eggs, whereby the milk is pretreated in specific process steps according to the invention, coagulated by heating, and the curd obtained is worked up by homogenization.

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The essential process steps in the preferred process of the invention for the preparation of the cheese-creme are the following: As raw material milk (or cream) is used, the fat content of which is about 0.05 to about 42.0 %, depending on how high fat content the final product should have. The milk used as raw material can be homogenized. Homogenization has for its part a restrictive effect to the formation of a normal curd. In a conventional cheese making curdling as strong as possible is pursued instead. The non-fat solids content of the raw material can be between about 7.0 and about 40.0 %. The solids content has influence on the amount of the whey to be removed when the solids content of the final product is adjusted.

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Depending on what kind of product is desired, homogenized or non-homogenized milk is heat treated either keeping it at about 65 to about 95 °C for about 0.5 to about 15 hours, preferably for about 1 to about 2 hours or, alternatively, heating it quickly (for 4-6 seconds) to a temperature of about 135 to 143 °C. This heavy heat treatment has a similar restrictive effect on the formation of curd than homogenization does. Using the heat treatment the casein bonds are occupied by whey proteins and membrane proteins of the fat spheres, as well as by lactose, whereupon the formation of curd is prevented. In addition, to the cheese-creme mass whey proteins can be included which are denatured in this heat treatment.

35

After the heat treatment the acidity of the milk is adjusted to pH value 5.7 to 6.0, preferably  $5.8 \pm 0.05$ , by adding carefully an acid or a souring agent. The acid

can be any acid accepted to be used in foods, e.g. lactic or citric acid. As a souring agent sour milk can be used, which is advantageous for use in the process of the invention. By the acidity adjustment the heating stability of the casein protein is shaken, whereby milk can be coagulated simply by heating. The pH 5.7 to 6.0 is not enough to coagulate milk, and thus it is not the question of acid coagulation.

After the acidity adjustment the milk is kept at the temperature of about 70 to 95 °C, preferably 75 to 90 °C, for about 0.5 to about 6 hours, whereby casein and also part of the whey proteins are coagulated. Provided the previous steps, i.e. heat treatment and acidity adjustment are carried out carefully in a correct way, a smooth, plastic mass which is obtained is easy to be worked up further. If e.g. the heat treatment is not sufficient, the curd will be too hard and glutinous, whereby it is almost impossible to work it up. It is the same with the pH, if it is allowed to be too low, i.e. if the milk is acid coagulated, the coagulate will be hard and "dry", and it cannot be worked up using a homogenizer. By cooking the mass coagulated by heating a final product is obtained which stands subsequent heating and working up.

If desired, some whey can be removed after the coagulation, whereby the solids content of the final product will be as desired. This step for its part affects the thickness of the texture of the final product.

After getting the solids of the mass to a desired value, the mass is worked up by homogenizing at a pressure of about 50 to about 300 kp/cm<sup>2</sup>, preferably over 100 kp/cm<sup>2</sup>, and usually about 150 to about 200 kp/cm<sup>2</sup>, and at a temperature of about 60 to about 90 °C, preferably at about 65 to about 85 °C, using e.g. a two-phase dairy homogenizer or a colloid mill. Working up itself and intensity

- thereof have an influence on the textural characteristics of the final product, such as thickness and smoothness. The homogenizing temperature should be  $>60^{\circ}\text{C}$  to keep the texture of the final product thick and to keep the whey from separating. When using a colloid mill the temperature should be between  $60$  and  $85^{\circ}\text{C}$ . After cooling the mass also stands cold-work, as well as hot-work carried out subsequently.
- 10 The mass worked up can be packed as hot, whereby it is cooled down in its package in a cold store or in a water bath. An advantage of packing as hot is the asepticity of the operation, i.e. the hot product "sterilizes" the package. The mass is cooled down slowly in the package, which also has a thickening effect on the texture. The mass can also be cooled down rapidly in a plate-form thermal conductor down to below  $10^{\circ}\text{C}$ , and packed only after that.
- 20 The cheese-creme containing eggs is prepared preferably by leading milk to a cheese kettle and heating it up to  $88^{\circ}\text{C}$ , adding souring agent as well as eggs or egg white thereto. The mixture contains preferably about 80 % of milk, about 16 % of souring agent (sour milk) and about 4 % of eggs calculated from the total weight of the starting mixture. As the souring agent also e.g. lactic or citric acid can be used instead of sour milk. When the souring agent and eggs are added, the temperature decreases (to about  $74^{\circ}\text{C}$ ), because of which the mixture is reheated, until it reaches a temperature of about  $84$  to  $85^{\circ}\text{C}$ . The mixture is kept at this temperature for at least about 1.5 hours, whereby a final product is obtained which is well heat-resistant.
- 35 After this the whey is decanted away and, if desired, salt and/or flavours are added into the mass. The mass is transferred via a pump to a homogenizer. Homogenization

takes place at 65 to 85 °C. The mass is passed through the pressure nozzle using a pressure of over 100 kp/cm<sup>2</sup>. The pressure can be between about 120 and about 300 kp/cm<sup>2</sup>. Usually a pressure of 160 to 180 kp/cm<sup>2</sup> is used.

5 The particle size of the homogeneous mass obtained varies depending of the conditions used from under 1 µm up to over 10 µm. The temperature and pressure used depend on what kind of consistency is desired for the final product. The higher pressure and temperature are used, the

10 harder mass will be obtained.

If desired, the mass can further be pasteurized, or some preservative, preferably sorbic acid can be added thereto. When the product is packed aseptically into small

15 cups, pasteurization or preservatives are usually not needed, but it is good to pasteurize a product which is packed to bigger batches and meant for large-scale kitchen use, or it is good to add sorbic acid thereto to guarantee its longer shelf-life.

20 The fat content of the milk used can vary in a similar manner as has been described above, depending on how high fat content the final product should have. If skimmed milk and egg-white are used, the product will be totally fat-free. The fat content of the final product is generally over 0.5 %, and usually between 0.5 and 60 %. The process can, however, be used to manufacture a product having the fat content of over 60 %. On the other hand the non-fat solids of the final product are generally

25 over 11 %, usually between 11 and 40 %. However, the non-fat solids can also be over 40 %.

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Homogenized cheese-creme mass can be salted to a salt concentration of e.g. about 1 to 1.5 %. To a non-salted

35 mass sugar can be added and it can be used to prepare e.g. pudding-like sweetened dessert which is flavoured with e.g. vanilla. Suitable spices for seasoning of a

salted cheese mass are e.g. herbs and garlic. The mass can also be seasoned with e.g. Emmental or Cheddar cheeses.

- 5 The cheese-creme according to the invention can be used in food preparation, as a raw material in food industry, or as such. It does not contain additives and it can be used both in cold and hot, as well as both in salty and sweet foods. The seasoned cheese-creme can be used e.g.  
10 as such as a spread on bread, and the non-seasoned cheese-creme can be used as a thickening ingredient in soups or as a cream substitute in different foods.

- 15 The following Examples illustrate the embodiments of the process of the invention for preparing cheese-creme. All percentages given above and hereafter mean percentages by weight.

- 20 **Example 1** Preparing of cheese-creme from homogenized milk

- 100 litres of homogenized milk, the fat content of which was 4.3 %, was placed into a cheese kettle, and the milk was heated up to 85 °C, and was kept at this temperature  
25 for 1.5 hours. pH of the milk was adjusted to 5.80 by adding 16 l of sour milk, pH of which was 4.4. The temperature was adjusted to 85 °C, whereby the milk was heat coagulated. The mixture was further kept at the temperature of 85 °C for 1.5 hours. 81 litres of whey were  
30 removed from the kettle and the mass was transferred to a homogenizer where it was homogenized at a pressure of 150 kp/cm<sup>2</sup> and at the temperature of 80 °C. A smooth, plastic mass was obtained, the total solids of which were 24.5 %. The mass was packed as hot (75 °C) into 3 kg buckets and  
35 150 g cups, which were transferred to a cold store, where they were allowed to cool down slowly.

**Example 2** Preparation of a pudding-like sweetened dessert flavoured by vanilla

30 litres of homogenized milk, the fat content of which  
5 was 3.5 %, was heated up to 85 °C, and kept at this temperature for 1.5 hours. Acidity was adjusted to the value of pH 5.76 by adding 5 l of fat-free sour milk, the pH of which was 4.4. The temperature was adjusted to 85 °C, whereby heat coagulation took place. The coagulate was  
10 cooked for one further hour at 80 °C to increase the working-up ability and heating stability of the final product. The solids were adjusted by removing 25 l of the whey, whereby the total solids of the final product were 24.35 %. Vanilla-aroma powder (1.5 g/l) mixed with 50 g  
15 of sugar was added to the hot mass. The flavoured mass was homogenized at the temperature of 75 °C at the pressure of 200 kp/cm<sup>2</sup>. The product was packed at 70 °C into 150 g cups which were allowed to cool down in a cold store.

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**Example 3** Preparation of cheese-creme spread seasoned with Cheddar

200 litres of fat-free milk was placed into a cheese  
25 kettle and heated up to 88 °C. 35 litres of sour milk and 7 kg of egg mass were added into the kettle. The temperature of the mixture was decreased to 74 °C. The mixture was stirred, whereby curdling took place, and the mixture was heated at the rate of about 3 °C / 10 minutes, until  
30 the temperature of 84 °C was achieved. The mixture was incubated for 1.5 hours maintaining a temperature of 84-85 °C.

The whey (about 140 l) was drained from the kettle,  
35 whereby about 100 kg of cheese mass was remained. 15 kg of Cheddar cheese was melted into 15 litres of whey, and this mixture was added into the cheese mass. The mass was

homogenized by passing it through the nozzle of a homogenizer at the pressure of 160 kp/cm<sup>2</sup>. The temperature of the mass in the beginning of the homogenization was about 80 °C.

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The homogeneous mass obtained was packed aseptically to cups holding 250 g, and they were sealed tightly.

**Example 4** Preparation of unseasoned cheese-creme suitable for large-scale kitchen use

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200 litres of milk, the fat content of which was 2.5 %, was placed into a cheese kettle and heated up to 88 °C. 35 litres of sour milk and 7 kg of egg mass were added into the kettle. The temperature of the mixture was decreased to 74 °C. The mixture was stirred, whereby curdling took place, and the mixture was heated at the rate of about 3 °C / 10 minutes, until the temperature of 84 °C was achieved. The mixture was incubated for 1.5 hours maintaining a temperature of 84-85 °C.

20

The whey (about 140 l) was drained from the kettle, whereby about 100 kg of cheese mass was remained. 1 kg of salt was added into this mass, it was stirred and homogenized by passing it through the nozzle of a homogenizer at the pressure of 180 kp/cm<sup>2</sup>. The temperature of the mass in the beginning of the homogenization was about 85 °C.

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2 g of sorbic acid was added into the mass, and it was packed aseptically to large-scale kitchen packages of 5 kg.

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**Claims**

1. A process for the preparation of a fresh cheese product, characterized in that milk is heat treated by  
5 keeping it at about 65 - to about 95 °C for about 0.5 to about 15 hours, or by heating it to 135-143 °C for 4-6 seconds, pH of the heat treated milk is adjusted to the value of 5.7 - 6.0, the mixture obtained is heated to about 70 - about 95 °C, whereby coagulation takes place;  
10 the coagulated mass is maintained at the temperature achieved for about 0.5 to about 6 hours, the mass is homogenized at the pressure of about 50 to about 300 kp/cm<sup>2</sup> and at a temperature of about 60 to about 90 °C, and cooled.  
15
2. The process according to claim 1, characterized in that the milk used as raw material is homogenized milk.
3. The process according to claim 1 or 2, characterized  
20 in that the fat content of the milk used as raw material is about 0.05 to about 42.0 %.
4. The process according to any one of claims 1-3, characterized in that the non-fat solids of the milk used as  
25 raw material are about 7.0 to about 40.0 %.
5. The process according to any one of claims 1-4, characterized in that the milk is heat treated by keeping it at a temperature of 85 to 95 °C for 1.5 hours.  
30
6. The process according to claim 1, characterized in that pH is adjusted to the value of  $5.8 \pm 0.05$ .
7. The process according to claim 6, characterized in  
35 that lactic acid, citric acid or sour milk is used to adjust the acidity.

8. The process according to claim 1, **characterized** in that the coagulated mass is kept at 75 to 90 °C for 1.5 hours.
- 5 9. The process according to claim 1, **characterized** in that before homogenization the solids content of the coagulated mass is adjusted to the desired value by removing whey.
- 10 10. The process according to claim 1, **characterized** in that to the milk heated to about 85 - about 95 °C about 4 % of eggs or egg white, and about 16 % of sour milk, calculated from the total weight of the mixture, are added.
- 15 11. The process according to any one of claims 1-10, **characterized** in that the mass is seasoned before or after homogenization, if so desired.
- 20 12. A fresh cheese product manufactured according to any one of claims 1-11.
- 25 13. The fresh cheese product according to claim 12, **characterized** in that its fat content is over 0.5 % and non-fat solids over 11 %.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 97/00497

## A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A23C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, DIALINDEX(FOODSCI)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	NORDISK MEJERIINDUSTRI, Volume 4, 1981, VAMLING, Gösta, "Ny BUKO-fabrik i Holstebro" page 225 - page 227 --	1-13
A	FOODS AND FOOD PRODUCTION ENCYCLOPEDIA, Volume, 1982, CONSIDINE, D.M. ET AL., "CREAM CHEESE" page 498 --	1-13
A	WO 9514389 A1 (UNILEVER N.V. ET AL.), 1 June 1995 (01.06.95), claims 1-2 --	1-13
P,A	WO 9637114 A1 (UNILEVER N.V. ET AL.), 28 November 1996 (28.11.96), claims 1,11 --	1-13

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

01/10/97

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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
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